

Remarks

Claims 1-7 and 9-54 are presently pending. Claims 13-25 and 39-54 have been withdrawn from consideration. By this paper, independent claim 1 has been amended.

Claim 1 is objected to due to informalities. As required claim 1 has been amended to remove "metal layer" and insert "conductive material."

Claim 1 stands rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application No. 2003/0183862 to Jin et al. ("Jin"). In each embodiment, Jin discloses capacitor structures with an upper interconnection (70, 100, 138, 168, 204, 258) disposed on an upper electrode (66, 94, 134, 162, 188). A disadvantage of having the upper electrode and upper interconnection as separate elements is an additional fabrication step. Furthermore, Jin admits to a disadvantage in the disclosed structure:

In a subsequent process of forming and patterning a conductive layer to an upper interconnection, a conductive fence can remain at a sidewall of the capacitor pattern 68 having the vertical structure to result in a bridge phenomenon in which current flows between an upper electrode and a bottom electrode.

Paragraph [0050] of Jin. As can be appreciated, the bridge phenomenon renders a capacitor structure dysfunctional. In order to prevent the bridge phenomenon, Jin discloses that an insulation layer is formed to cover the capacitor structure. Paragraph [0051] of Jin. This requires yet another fabrication step.

In the present invention, the top electrode and upper interconnection are not separate elements. The top electrode layer 160 serves as the top electrode 160 and as an interconnect. Paragraphs [0037], [0057], and [0063]. By this paper, claim 1 has been amended to recite that the top electrode forms an interconnect. An additional fabrication step for an upper interconnect is not required. An additional fabrication step to form an insulation layer to prevent bridge

phenomenon is also not required. This claimed feature is not taught or suggested in Jin and represents a significant improvement in capacitor structure.

Claim 1 is further amended to recite that the top electrode substantially fills the capacitor trenches. Support is found for this amendment in paragraph [0037] and the accompanying figures. In Jin, all disclosed embodiments illustrate that the upper electrodes only partially fill the capacitor trenches. An interconnection conductive layer is required to completely fill the capacitor trenches. This requires an additional fabrication step to fill the capacitor trenches. In the present invention, the conformance of the top electrode layer 160 to the trench sidewalls is not at issue as the top electrode layer 160 simply fills the trench after the dielectric 150 is deposited. Paragraph [0037]. The present invention simplifies fabrication as a single step is required to complete a trench filling.

As Jin does not include all limitations of claim 1, it cannot be an anticipatory reference.

Independent claim 26 stands rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,777,423 to Kubo ("Kubo"). Claim 26 recites a bottom electrode that comprises a bottom electrode layer and a bottom electrode plug. The Office Action relies on the polycrystalline silicon plug 13 for the teaching of a bottom electrode plug. In Kubo, the plug 13 is always stated to be a polycrystalline silicon plug. Silicon is not an electrode. An electrode is defined as "a conductor through which an electric current enters or leaves a nonmetallic portion of a circuit, as a dielectric, an electrolyte, or a semiconductor." Webster's College Dictionary, 1992. It is well known that silicon is not a conductor, but may be used as a semiconductor. A semiconductor is not conductor or an electrode.

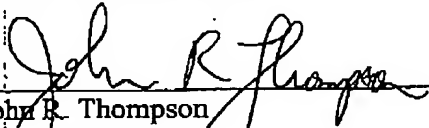
The differences between the silicon plug of Kubo and the present invention are further evident by their placement and function. In Kubo, the silicon plug 13, is covered with the lower

electrode 21. The silicon plug 13 does not directly contact the dielectric film 500. The silicon plug 13 is not a metal and does not function as lower electrode. In the present invention, the bottom electrode plug 144 extends from the lower electrode and directly contacts and is covered by the capacitor dielectric 150. The bottom electrode plug 144 is part of the bottom electrode 140 and functions as an electrode. As Kubo does not teach or suggest an electrode plug extending into a capacitor trench, Kubo cannot anticipate claim 26. In order to anticipate "every element of the claimed invention must be identically shown in a single reference." In re Bond, 910 F.2d 831, 15 USPQ 2d 1566 (Fed. Cir. 1990).

The Applicant respectfully submits that claims 1 and 26 represent patentable subject matter. As depending claims 2-7, 9-12, and 27-38 depend from their respective independent claims and include all their limitations, they likewise contain patentable subject matter.

Applicant believes the application is now in condition for allowance and respectfully requests the same. The Examiner is encouraged to telephone the undersigned if any issues remain.

Respectfully submitted,

  
John R. Thompson  
Reg. No. 40,842  
Attorney for Applicant

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201 S. Main Street  
Suite 1100  
Salt Lake City, UT 84111  
direct (801) 578-6994  
fax (801) 578-6999